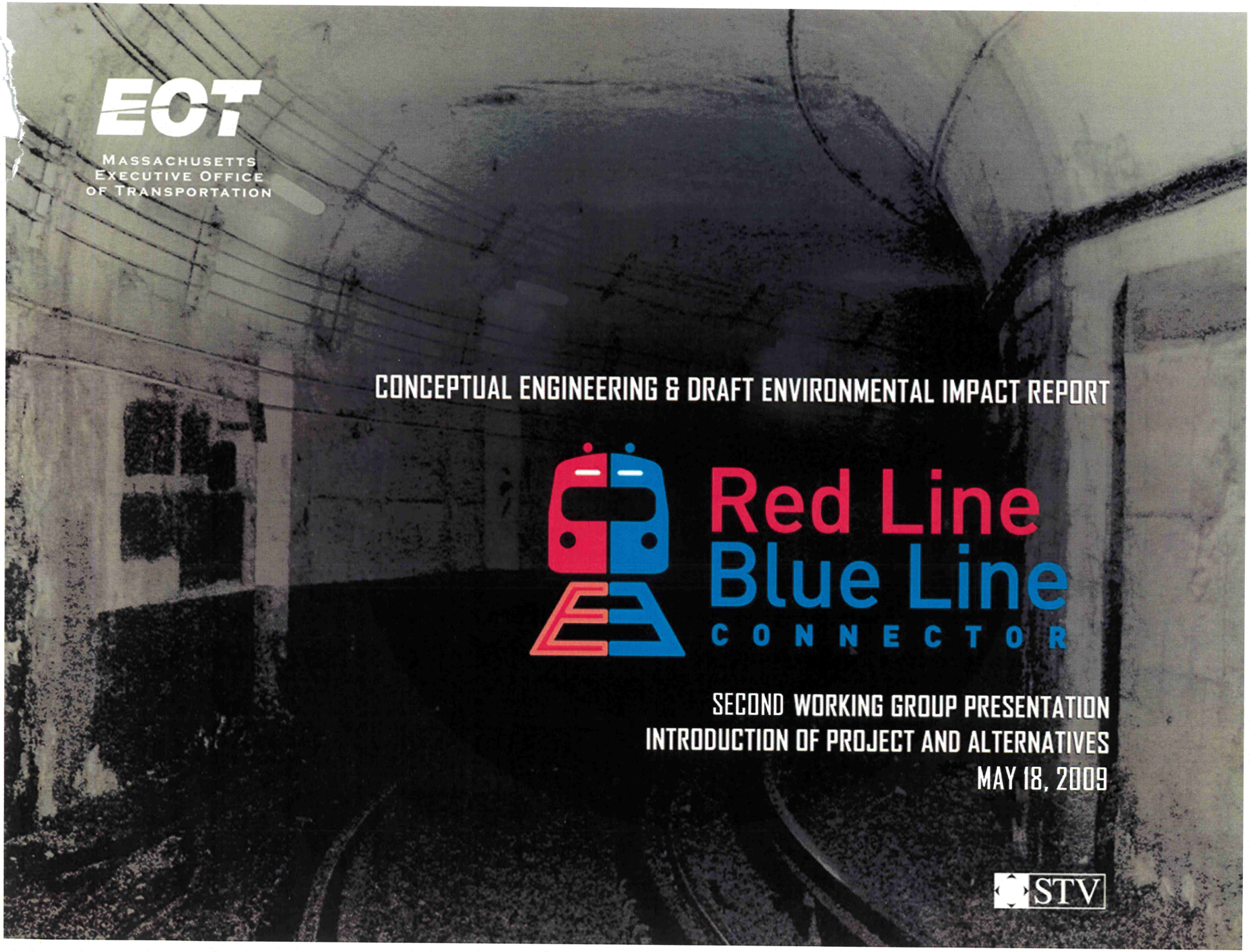
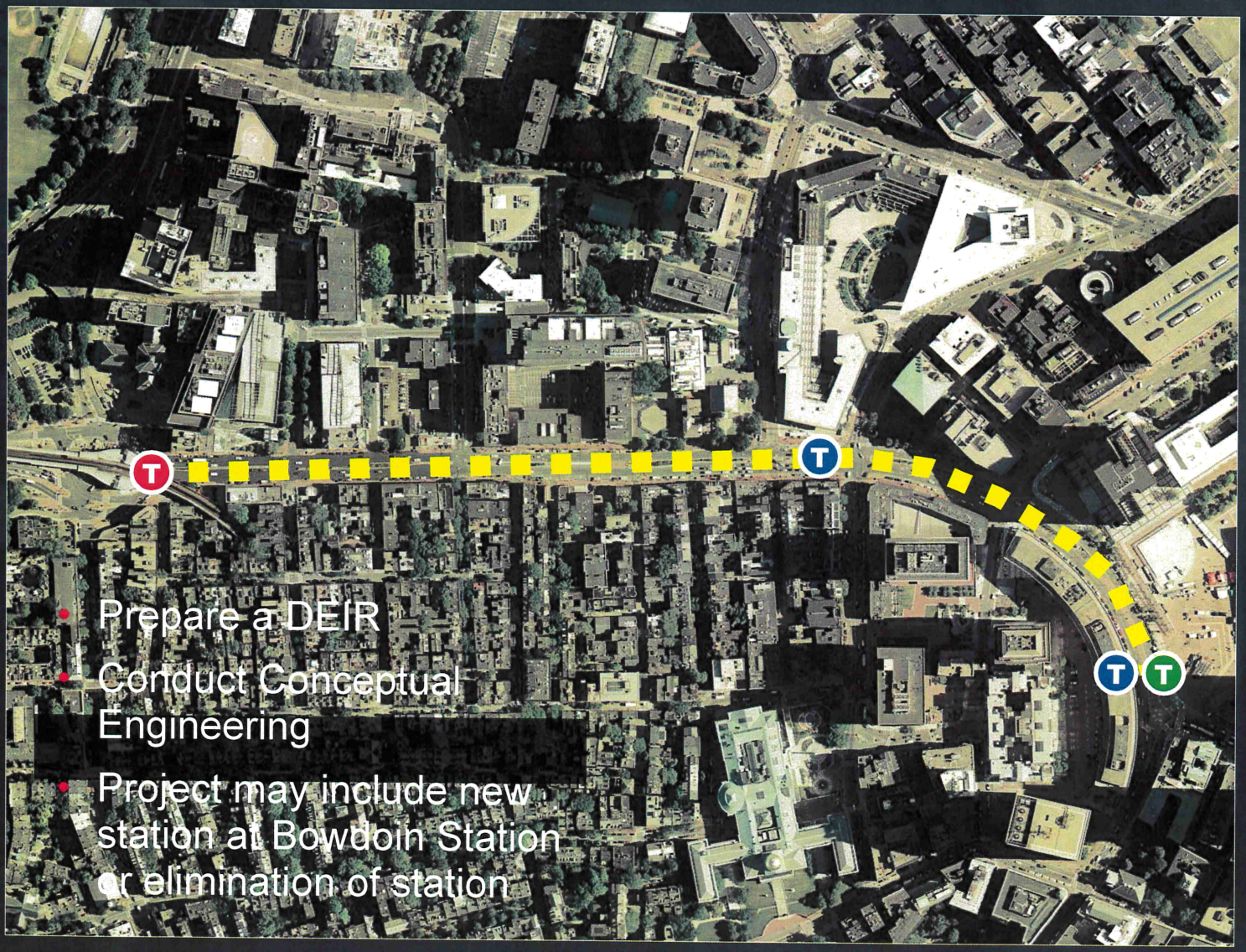

EOT
MASSACHUSETTS
EXECUTIVE OFFICE
OF TRANSPORTATION
CONCEPTUAL ENGINEERING & DRAFT ENVIRONMENTAL IMPACT REPORT
Red Line
Blue Line
CONNECTOR
SECOND WORKING GROUP PRESENTATION
INTRODUCTION OF PROJECT AND ALTERNATIVES
MAY 18, 2009
STV

# 1.0 Introduction


Prepare a DEIR
Conduct Conceptual Engineering
Project may include new station at Bowdoin Station or elimination of station

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# SOE Methods

- Slurry Walls
- Secant Pile Walls
- Jet Grout Walls
- Sheet-Pile Walls
- Soldier Pile and Lagging

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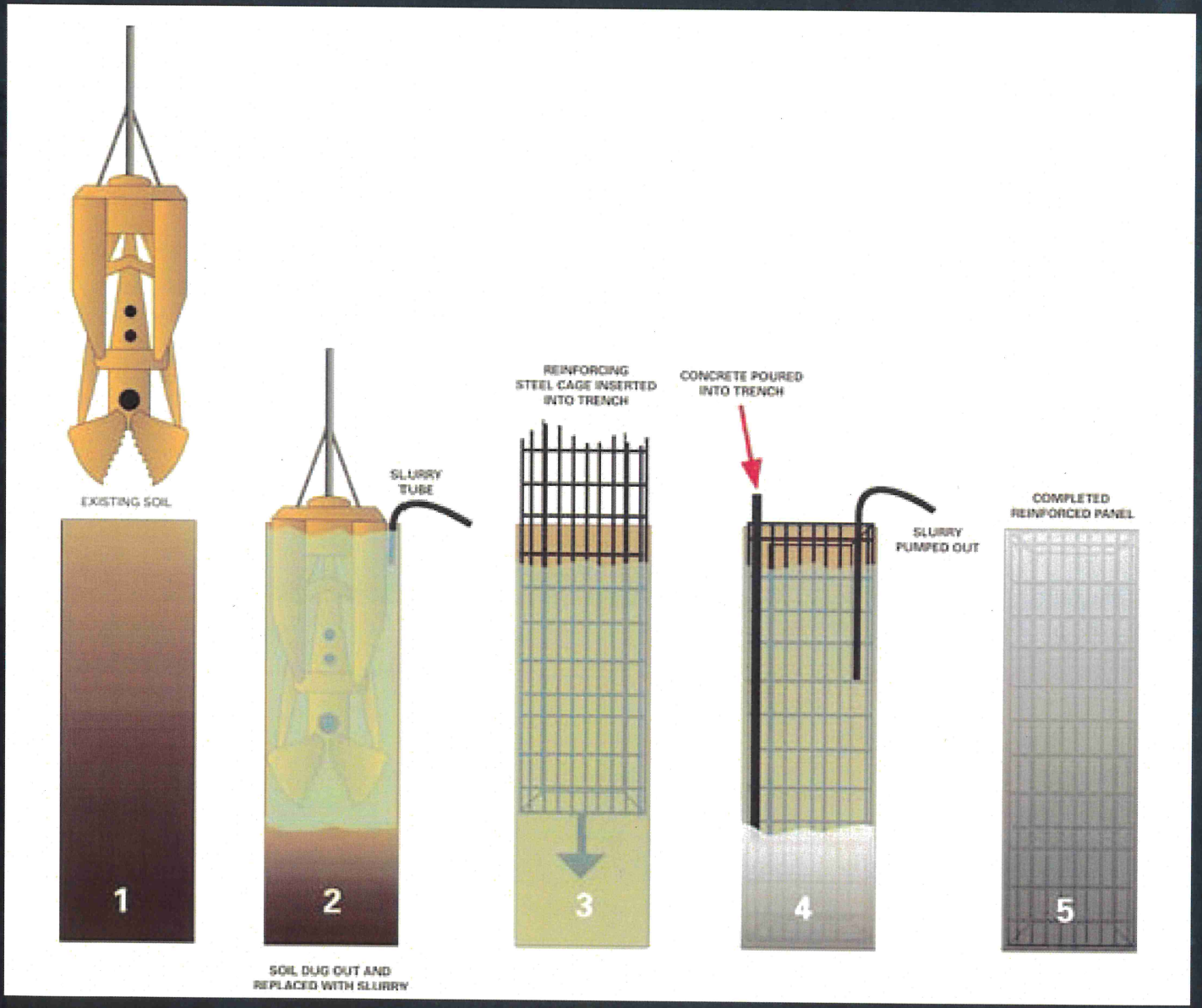
# Slurry Wall Process

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# Slurry Wall Excavation

The Hydromill Trench Cutter is a specialized piece of equipment to excavate slurry walls.

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# Disadvantages of Slurry Wall System

Photo: CA/T Atlantic Avenue Excavation

- High cost
- Requires special Equipment
- Utility impacts

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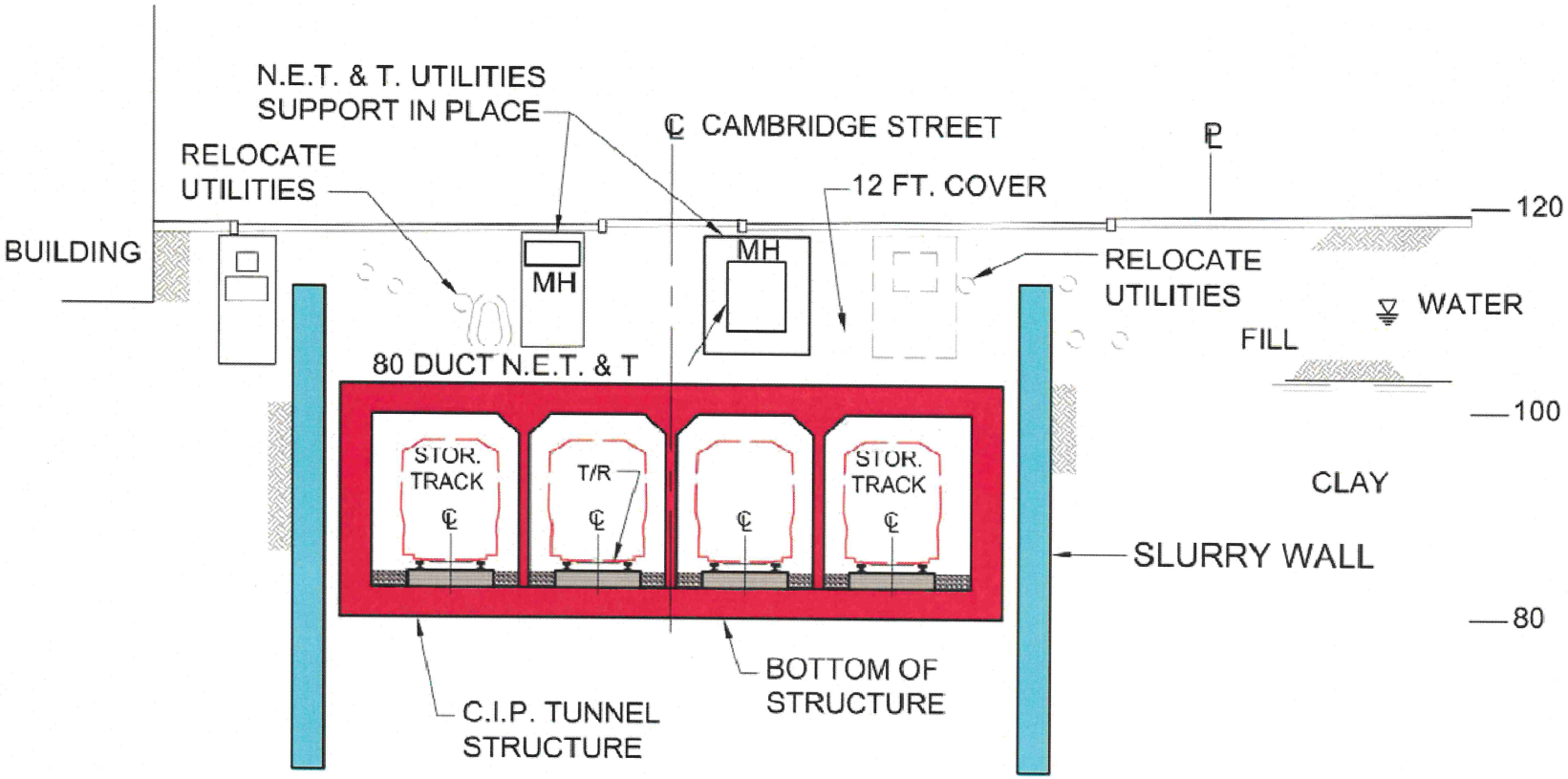


SLURRY WALL

## SECTION AT ANDERSON STREET

# Advantages of a Secant Pile Wall System

- Durable temporary wall
- Waterproofed at existing structure interface
- Core through obstructions

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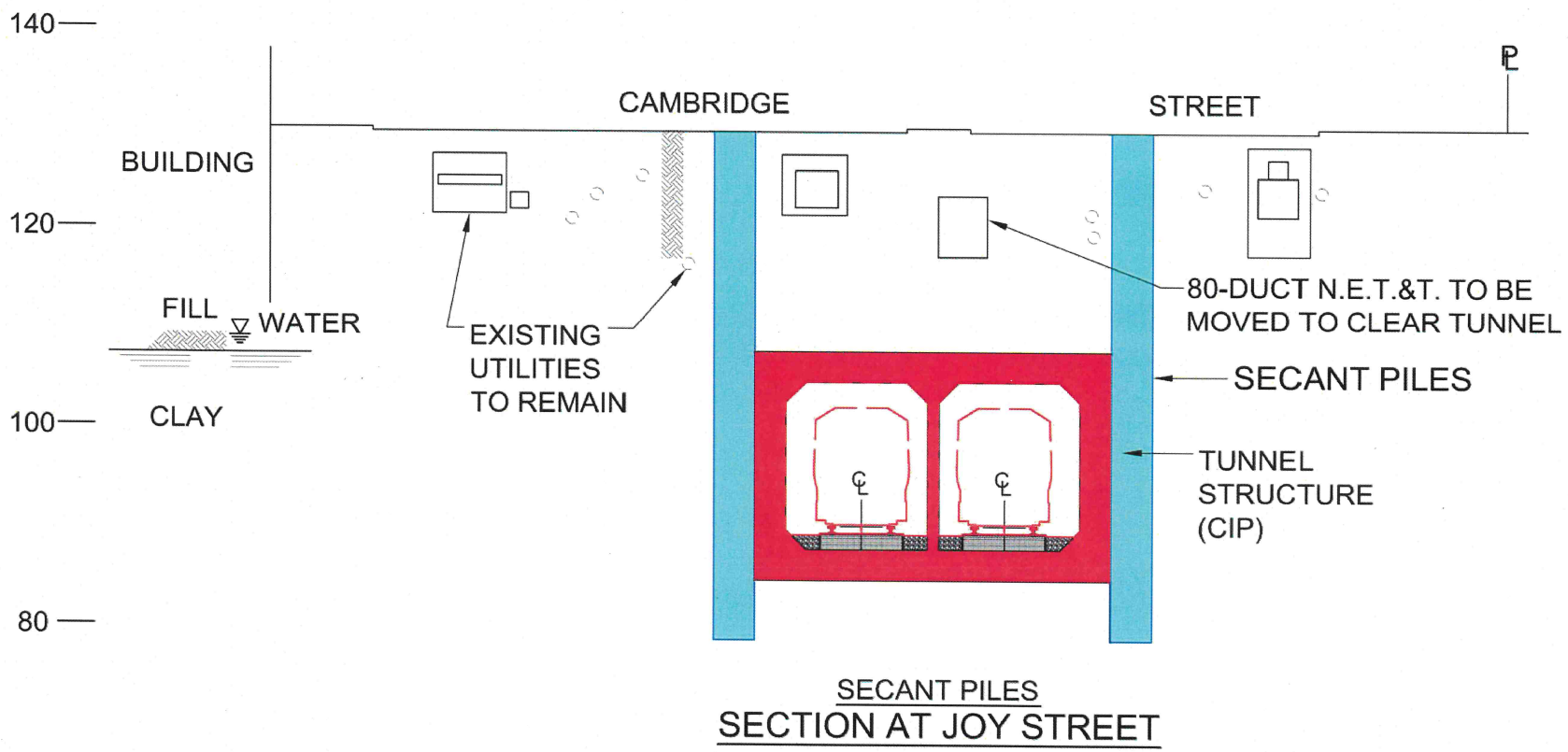


SECANT PILES

## SECTION AT JOY STREET

# Sheet pile Walls

- Interlocking steel sheet piles
- Cantilevered or braced with struts and wales
- Tie backs, in lieu of bracing

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# Advantages of Sheet Pile Wall System

Photo: Sheet Pile Wall with Waler and Bracing for Silver Line Tunnel

- Inexpensive

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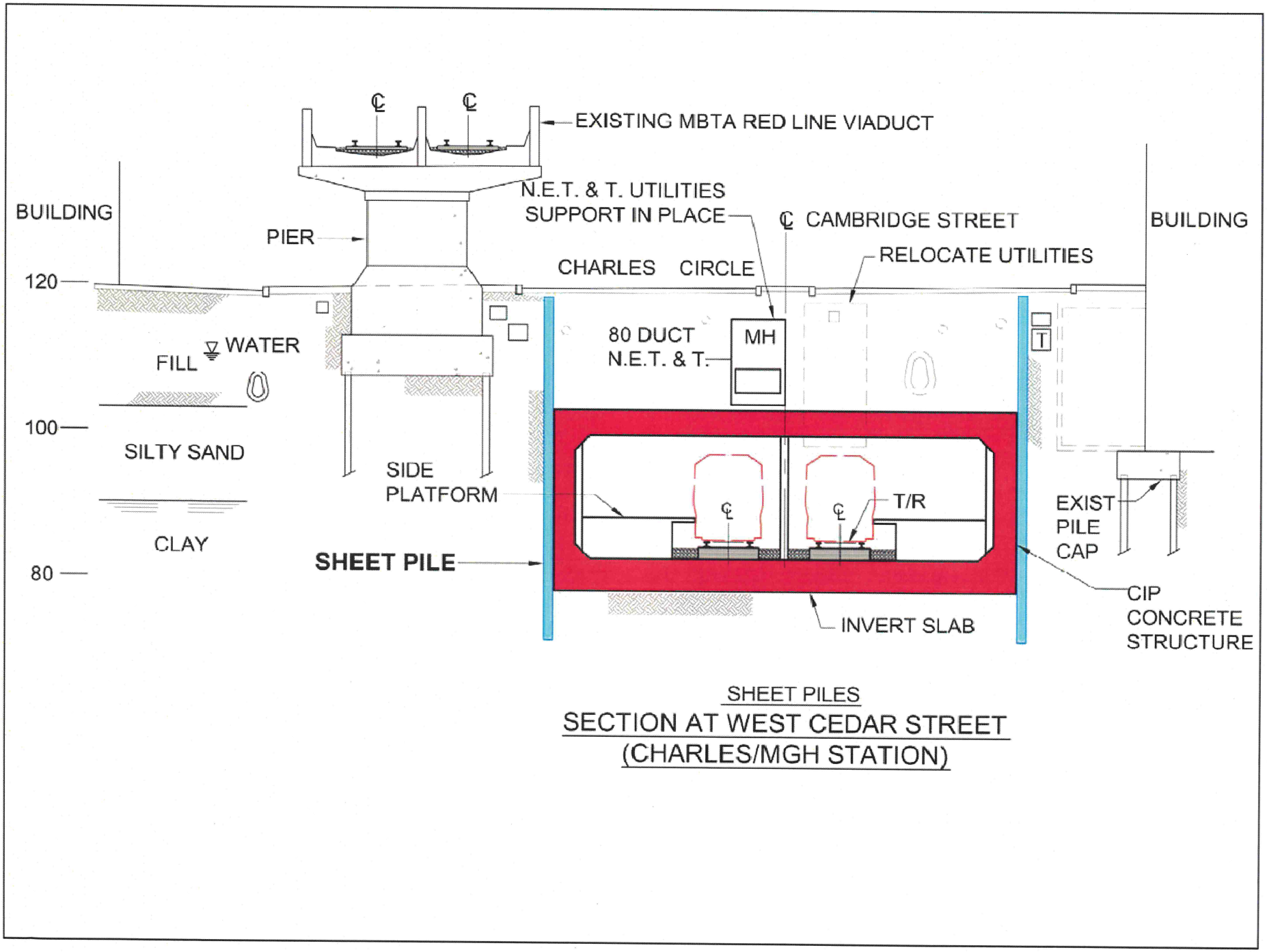


SHEET PILES

## SECTION AT WEST CEDAR STREET (CHARLES/MGH STATION)

# Advantages of a Soldier Pile and Lagging System

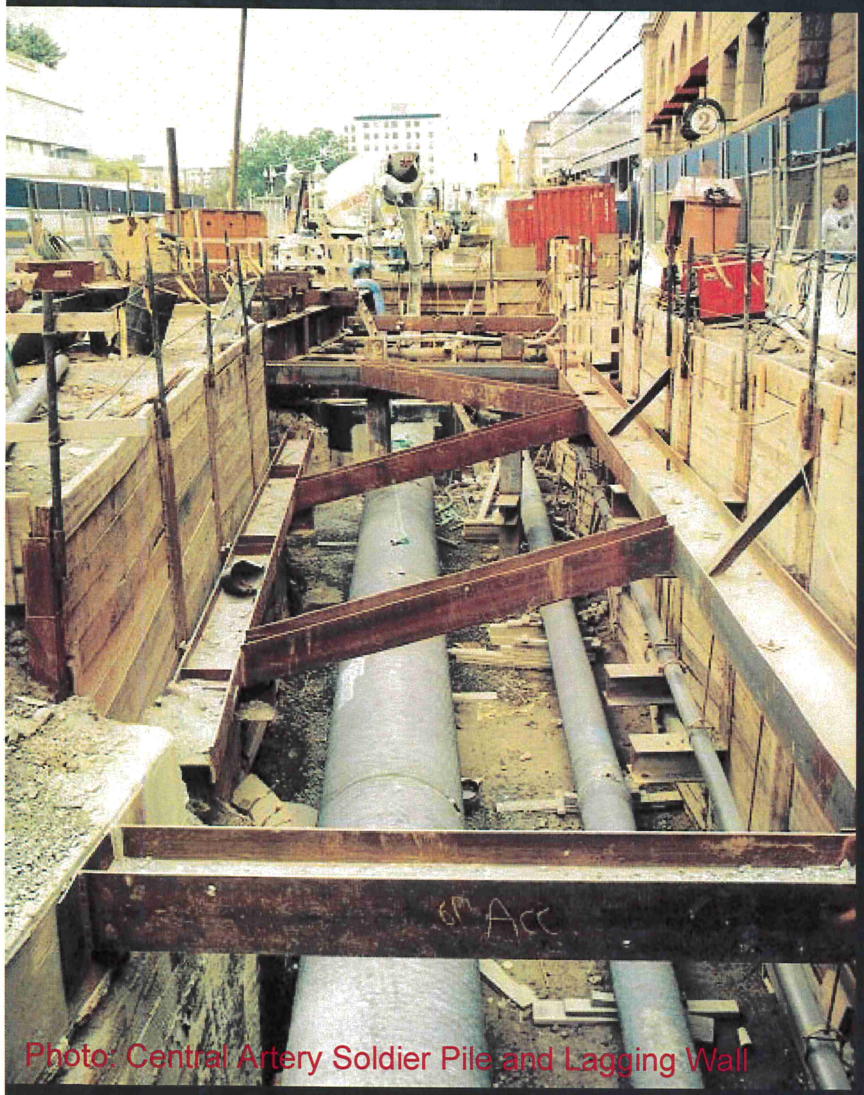

Photo: Central Artery Soldier Pile and Lagging Wall

- Inexpensive and easy to build
- Flexible enough to fit around existing utilities

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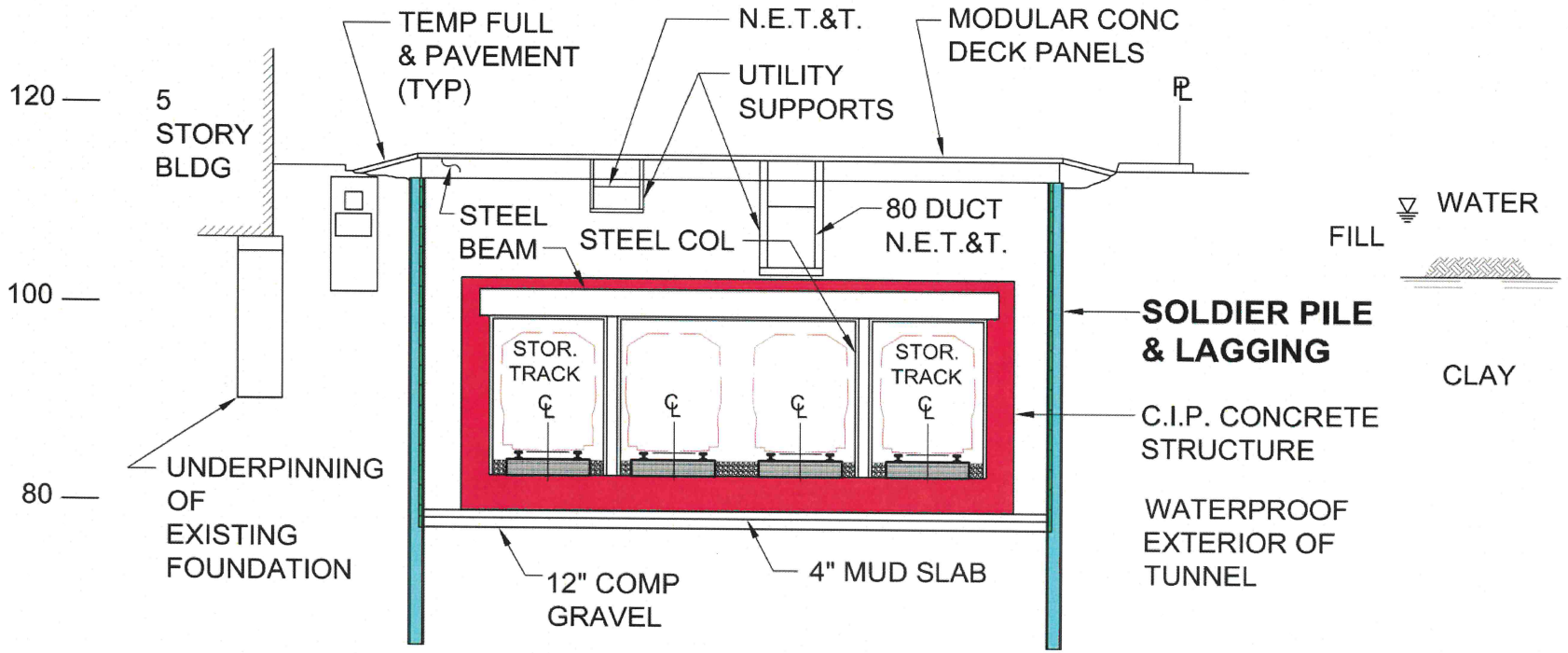


SOLDIER PILE AND LAGGING

## SECTION AT ANDERSON STREET

# Steel Cross Bracing

Photo: Greenbush Line Hingham Square Underpass Bracing

Most common method of bracing consists of either one or more rows of cross bracing.

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# Top-down Construction

This method is advantageous for larger excavations, but may require pre founded foundations  or columns.

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# Mining Methods

Photo: Balanced Earth Pressure Method Excavation on Central Artery

- Sequential Excavation Method
- Balanced Earth Pressure Method

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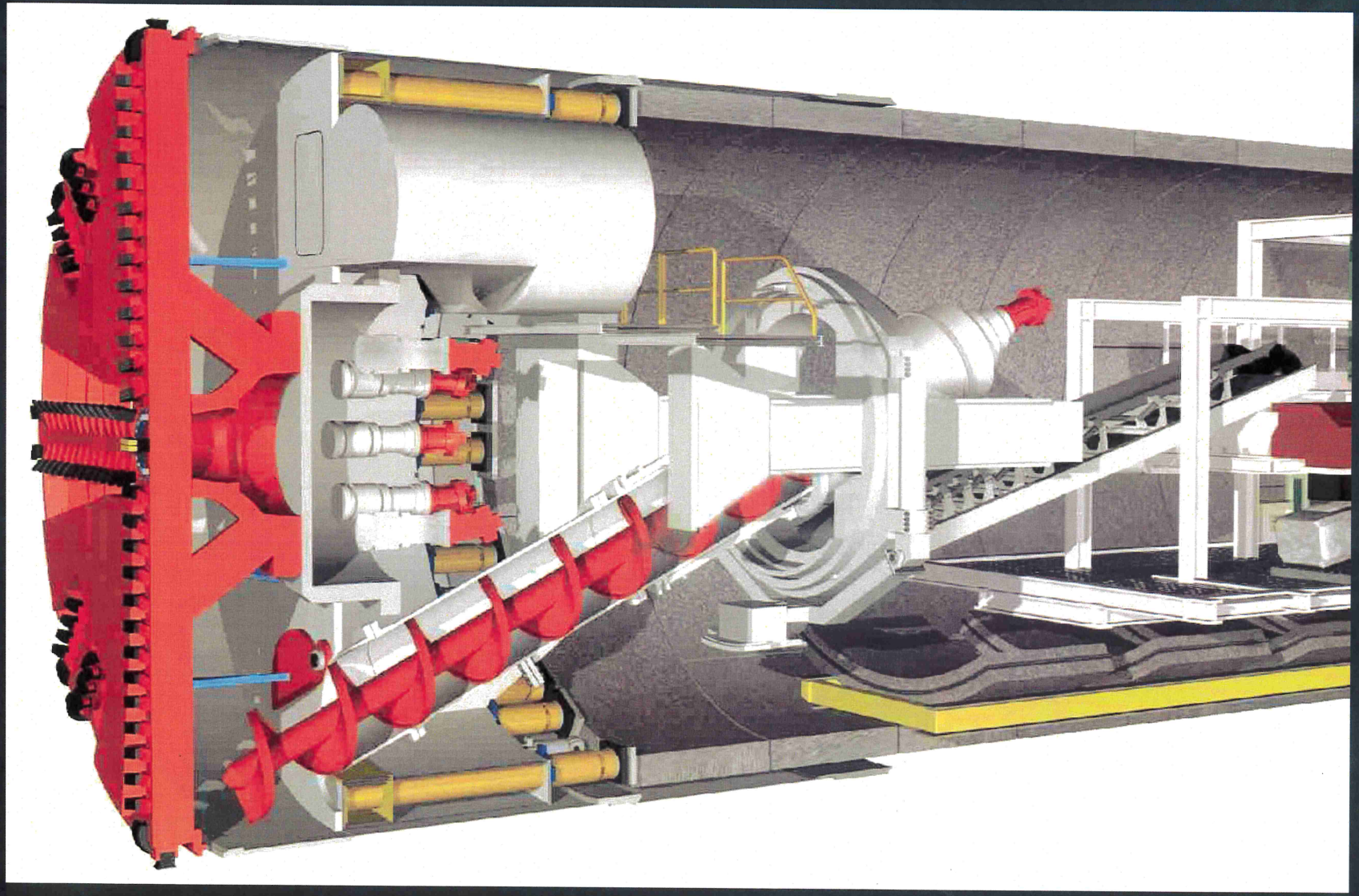
# Tunnel Boring Machine Method



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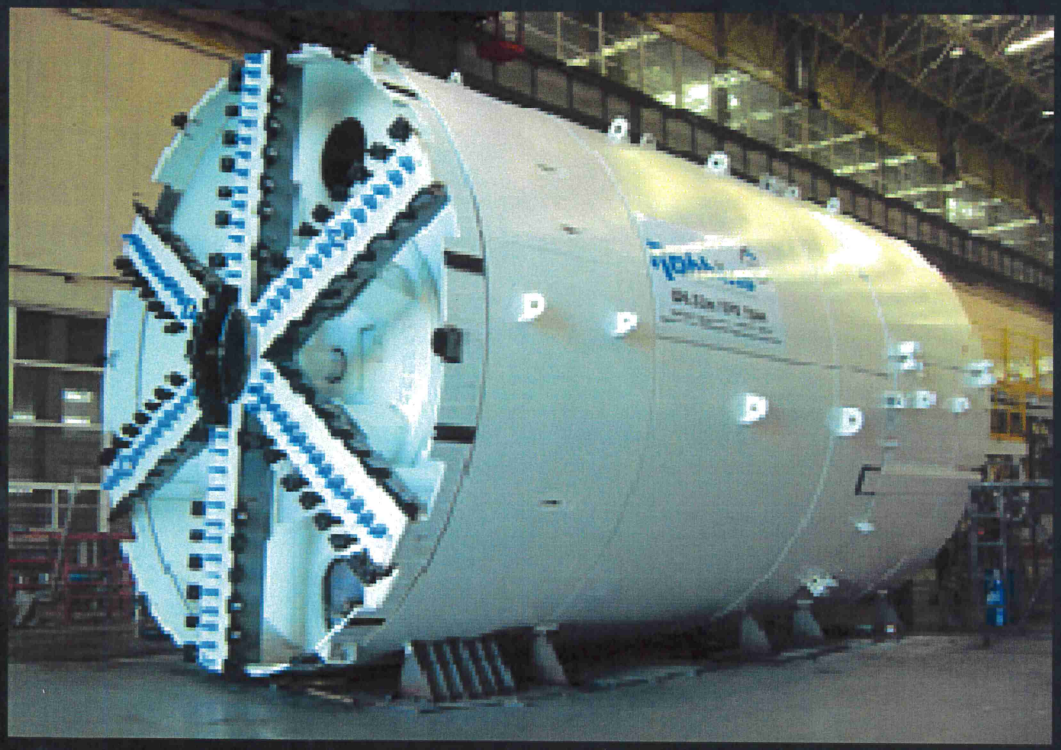
# Disadvantages of Mining



- Expensive relative to other excavation techniques

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# Evaluation Criteria

- **Transit Service/Operations**
  - Station Access
  - Operations
  - Storage and Layover
- **Construction Impacts**
  - Construction Duration
  - Traffic Impacts
  - Pedestrian Impacts
  - Environmental Impacts (related to construction)
  - Impacts to Blue Line Operations
  - Impacts to Red Line Operations
  - Impacts to Business and Residents
- **Ease of Implementation**
  - Available Right of Way
  - Impact on other Transportation Projects
  - Compatibility with State Implementation Plan
- **Environment**
  - Historic/Archeological
  - Noise and Vibration
  - Groundwater/ Stormwater
  - Parklands
- **Construction Impacts**
  - Capital Costs
  - Operation and Maintenance Costs

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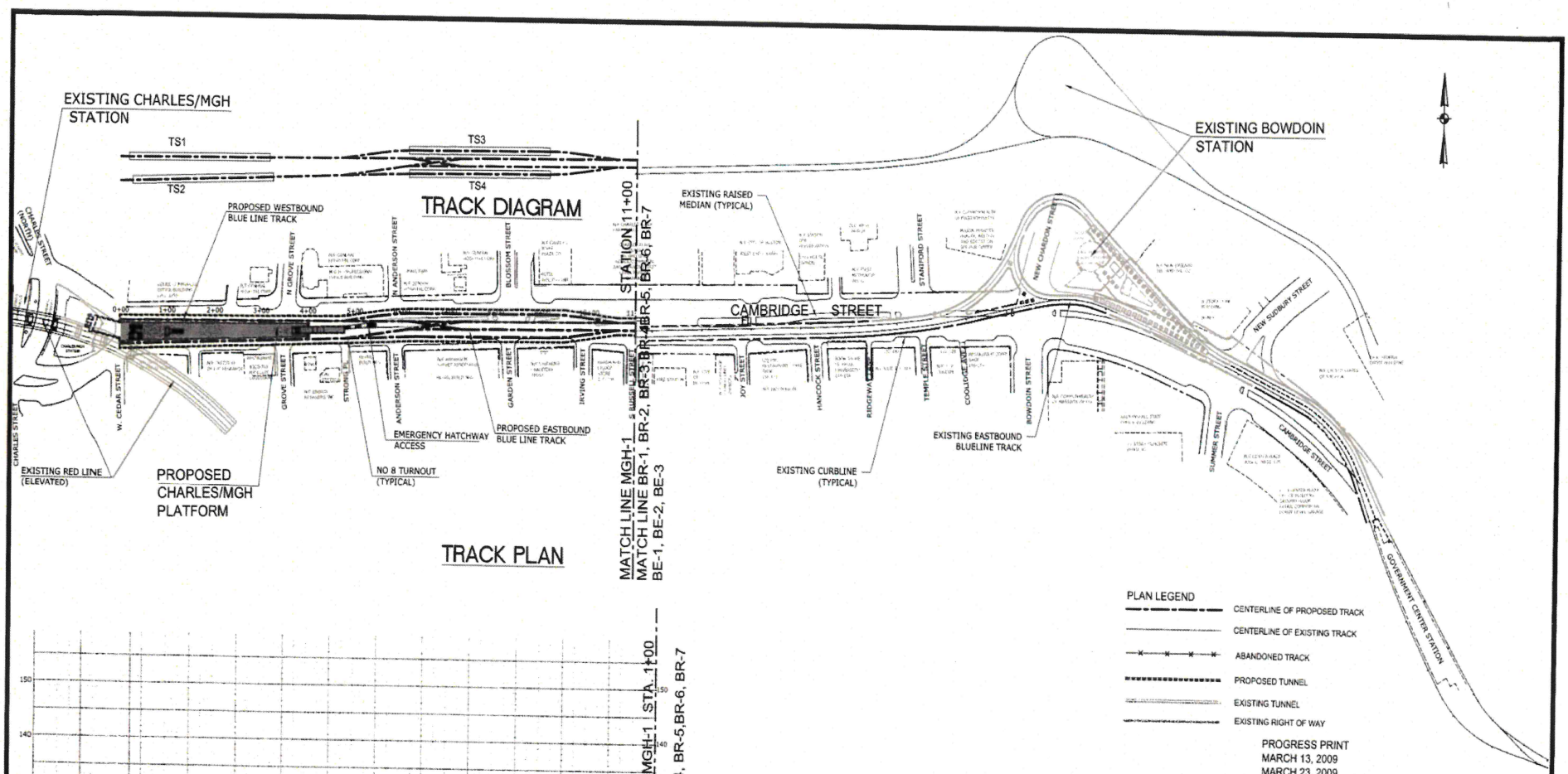
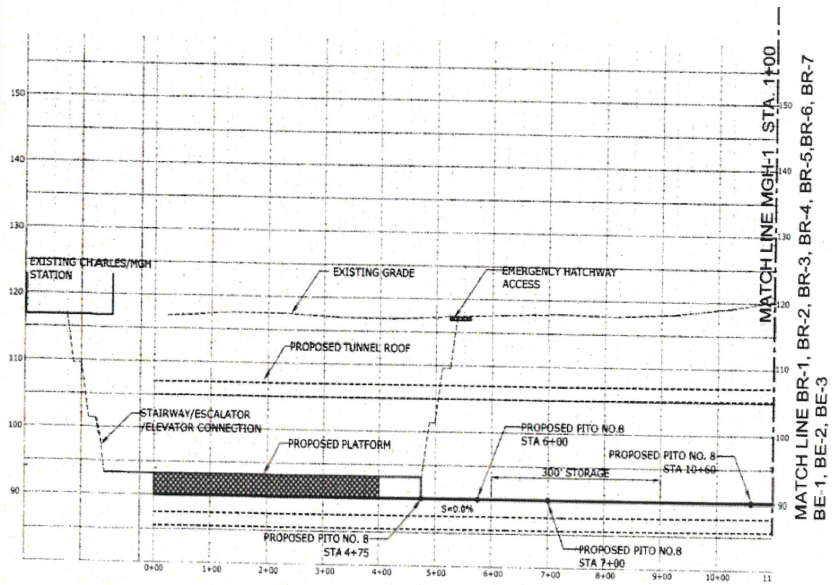
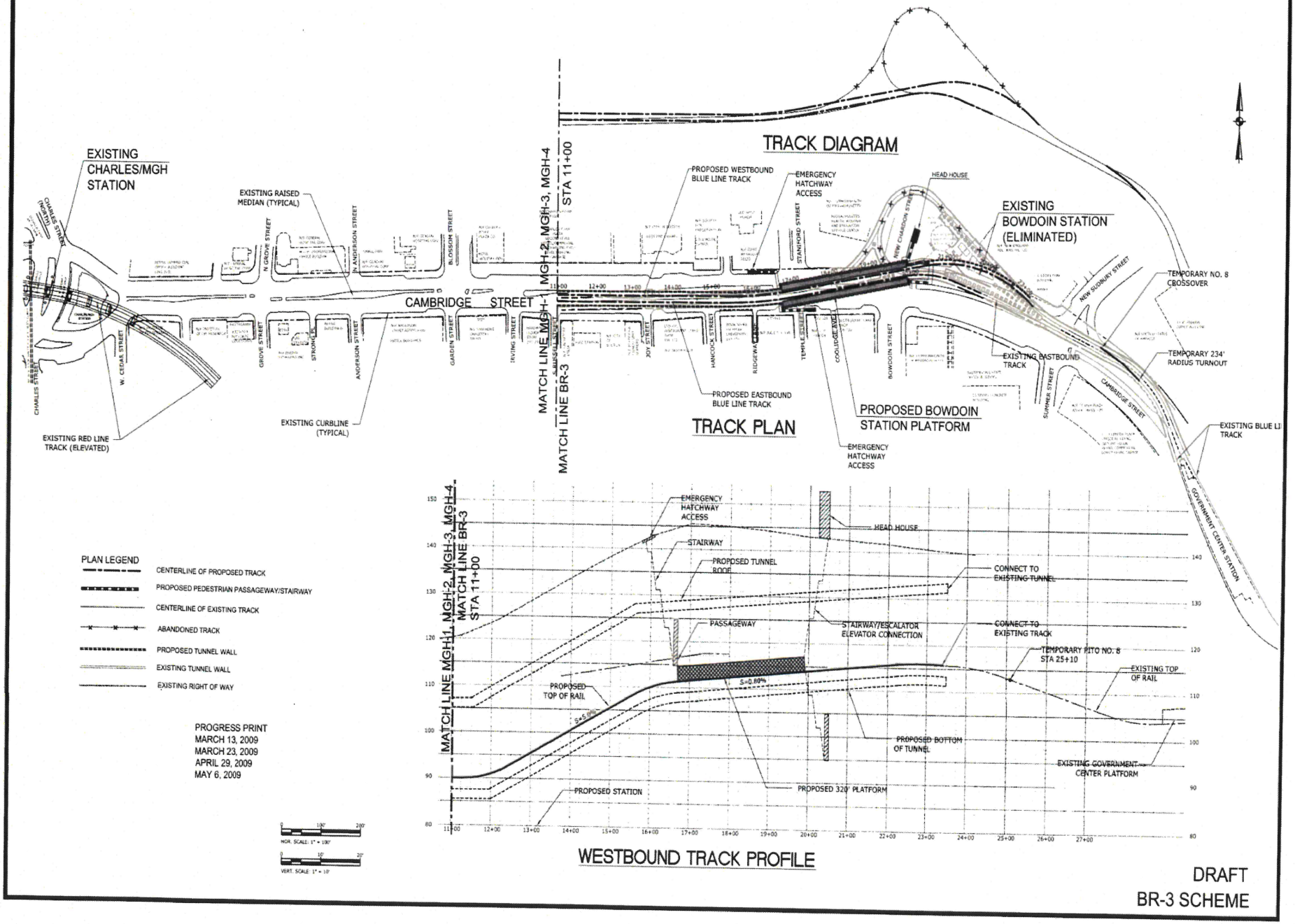
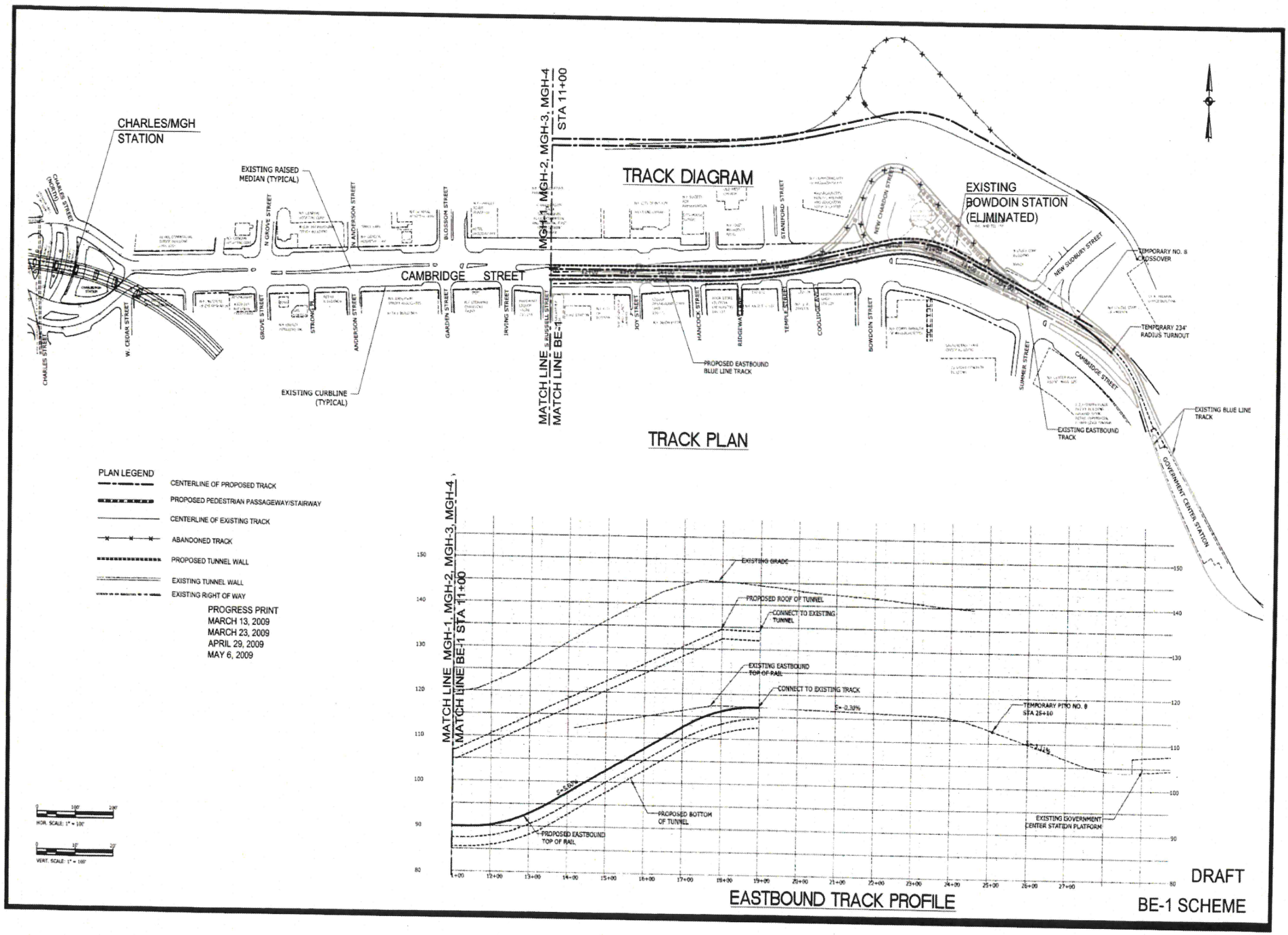
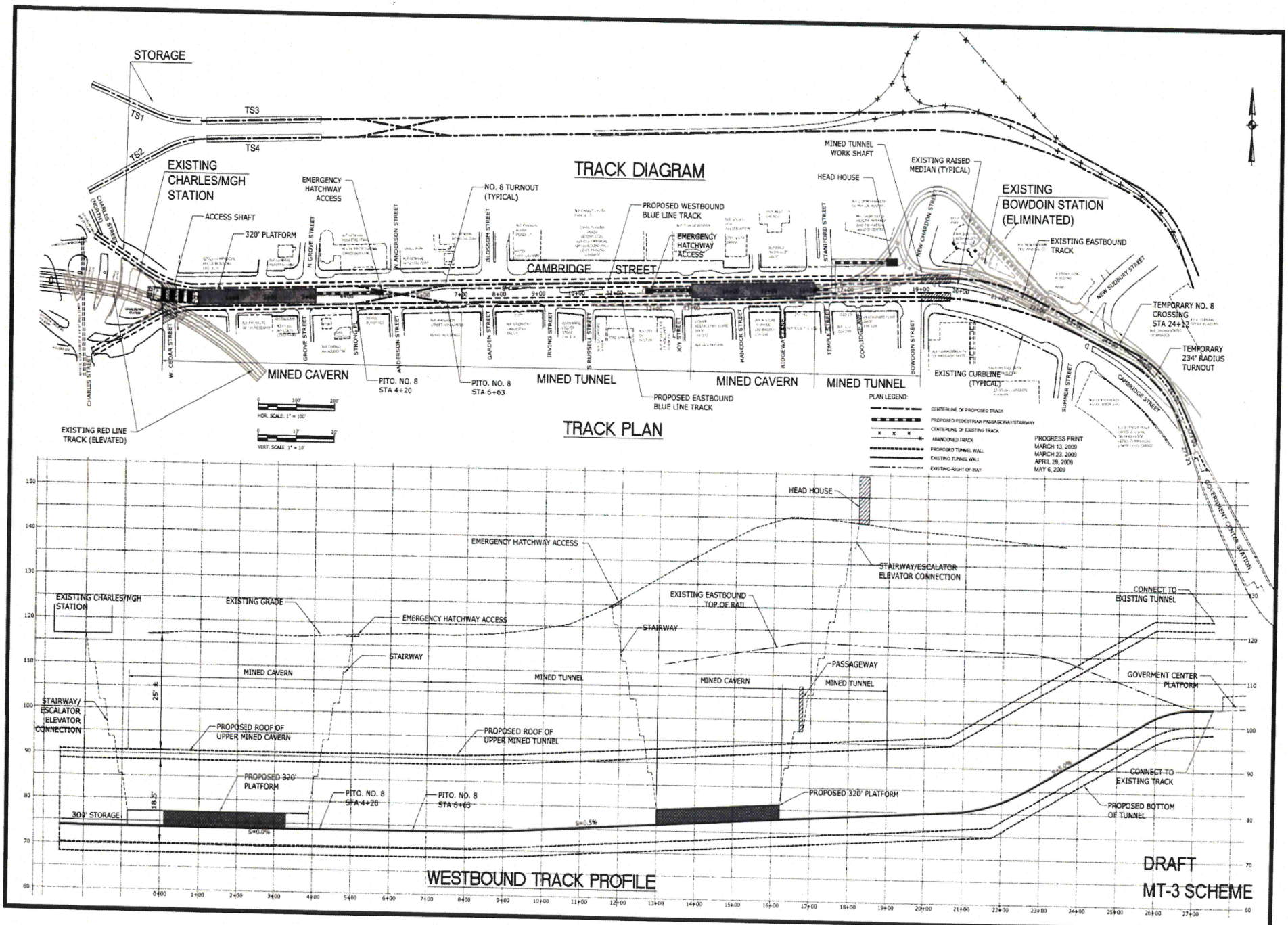



DRAFT
MGH-1 SCHEME


TRACK DIAGRAM
EXISTING CHARLES/MGH STATION
EXISTING RAISED MEDIAN (TYPICAL)
CAMBRIDGE STREET
MATCH LINE MGH-1, MGH-2, MGH-3, MGH-4
STA 11+00
MATCH LINE BR-3
PROPOSED WESTBOUND BLUE LINE TRACK
EMERGENCY HATCHWAY ACCESS
HEAD HOUSE
EXISTING BOWDOIN STATION (ELIMINATED)
TEMPORARY NO. 8 CROSSOVER
TEMPORARY 234' RADIUS TURNOUT
EXISTING EASTBOUND TRACK
PROPOSED EASTBOUND BLUE LINE TRACK
PROPOSED BOWDOIN STATION PLATFORM
EMERGENCY HATCHWAY ACCESS
EXISTING BLUE LI TRACK
EXISTING RED LINE TRACK (ELEVATED)
EXISTING CURBLINE (TYPICAL)
TRACK PLAN
PLAN LEGEND
CENTERLINE OF PROPOSED TRACK
PROPOSED PEDESTRIAN PASSAGEWAY/STAIRWAY
CENTERLINE OF EXISTING TRACK
ABANDONED TRACK
PROPOSED TUNNEL WALL
EXISTING TUNNEL WALL
EXISTING RIGHT OF WAY
PROGRESS PRINT
MARCH 13, 2009
MARCH 23, 2009
APRIL 29, 2009
MAY 6, 2009
HOR. SCALE: 1" = 100'
VERT. SCALE: 1" = 10'
EMERGENCY HATCHWAY ACCESS
HEAD HOUSE
STAIRWAY
PROPOSED TUNNEL ROOF
CONNECT TO EXISTING TUNNEL
PASSAGEWAY
STAIRWAY/ESCALATOR ELEVATOR CONNECTION
CONNECT TO EXISTING TRACK
TEMPORARY PITO NO. 8 STA 25+10
EXISTING TOP OF RAIL
PROPOSED TOP OF RAIL
S=0.80%
PROPOSED BOTTOM OF TUNNEL
EXISTING GOVERNMENT CENTER PLATFORM
PROPOSED STATION
PROPOSED 320' PLATFORM
WESTBOUND TRACK PROFILE
DRAFT
BR-3 SCHEME


TRACK DIAGRAM
CHARLES/MGH STATION
EXISTING RAISED MEDIAN (TYPICAL)
CAMBRIDGE STREET
MATCH LINE MGH-1, MGH-2, MGH-3, MGH-4 STA 11+00
MATCH LINE BE-1
EXISTING CURBLINE (TYPICAL)
PROPOSED EASTBOUND BLUE LINE TRACK
EXISTING BOWDOIN STATION (ELIMINATED)
TEMPORARY NO. 8 CROSSOVER
TEMPORARY 234' RADIUS TURNOUT
EXISTING EASTBOUND TRACK
EXISTING BLUE LINE TRACK
GOVERNMENT CENTER STATION
TRACK PLAN
PLAN LEGEND
CENTERLINE OF PROPOSED TRACK
PROPOSED PEDESTRIAN PASSAGEWAY/STAIRWAY
CENTERLINE OF EXISTING TRACK
ABANDONED TRACK
PROPOSED TUNNEL WALL
EXISTING TUNNEL WALL
EXISTING RIGHT OF WAY
PROGRESS PRINT
MARCH 13, 2009
MARCH 23, 2009
APRIL 29, 2009
MAY 6, 2009
MATCH LINE MGH-1, MGH-2, MGH-3, MGH-4, MATCH LINE BE-1 STA 11+00
EXISTING GRADE
PROPOSED ROOF OF TUNNEL
CONNECT TO EXISTING TUNNEL
EXISTING EASTBOUND TOP OF RAIL
CONNECT TO EXISTING TRACK
TEMPORARY PITO NO. 8 STA 25+10
PROPOSED BOTTOM OF TUNNEL
PROPOSED EASTBOUND TOP OF RAIL
EXISTING GOVERNMENT CENTER STATION PLATFORM
EASTBOUND TRACK PROFILE
DRAFT
BE-1 SCHEME


STORAGE
TS1
TS2
TS3
TS4
EXISTING CHARLES/MGH STATION
ACCESS SHAFT
320' PLATFORM
EMERGENCY HATCHWAY ACCESS
NO. 8 TURNOUT (TYPICAL)
TRACK DIAGRAM
PROPOSED WESTBOUND BLUE LINE TRACK
EMERGENCY HATCHWAY ACCESS
MINED TUNNEL WORK SHAFT
HEAD HOUSE
EXISTING RAISED MEDIAN (TYPICAL)
EXISTING BOWDOIN STATION (ELIMINATED)
EXISTING EASTBOUND TRACK
CAMBRIDGE STREET
NEW CHARDON STREET
NEW SUDBURY STREET
TEMPORARY NO. 8 CROSSING STA 24+12
TEMPORARY 234' RADIUS TURNOUT
MINED CAVERN
MINED TUNNEL
MINED CAVERN
MINED TUNNEL
PITO. NO. 8 STA 4+20
PITO. NO. 8 STA 6+63
PROPOSED EASTBOUND BLUE LINE TRACK
EXISTING CURBLINE (TYPICAL)
EXISTING RED LINE TRACK (ELEVATED)
HOR. SCALE: 1" = 100'
VERT. SCALE: 1" = 10'
TRACK PLAN
PLAN LEGEND:
CENTERLINE OF PROPOSED TRACK
PROPOSED PEDESTRIAN PASSAGEWAY/STAIRWAY
CENTERLINE OF EXISTING TRACK
ABANDONED TRACK
PROPOSED TUNNEL WALL
EXISTING TUNNEL WALL
EXISTING RIGHT-OF-WAY
PROGRESS PRINT
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HEAD HOUSE
EMERGENCY HATCHWAY ACCESS
STAIRWAY/ESCALATOR ELEVATOR CONNECTION
EXISTING CHARLES/MGH STATION
EXISTING GRADE
EMERGENCY HATCHWAY ACCESS
EXISTING EASTBOUND TOP OF RAIL
STAIRWAY
CONNECT TO EXISTING TUNNEL
STAIRWAY
PASSAGEWAY
MINED CAVERN
MINED TUNNEL
MINED CAVERN
MINED TUNNEL
GOVERMENT CENTER PLATFORM
STAIRWAY/ ESCALATOR ELEVATOR CONNECTION
25'±
PROPOSED ROOF OF UPPER MINED CAVERN
PROPOSED ROOF OF UPPER MINED TUNNEL
PROPOSED 320' PLATFORM
PITO. NO. 8 STA 4+20
PITO. NO. 8 STA 6+63
PROPOSED 320' PLATFORM
CONNECT TO EXISTING TRACK
18'±
300' STORAGE
S=0.0%
S=0.5%
PROPOSED BOTTOM OF TUNNEL
WESTBOUND TRACK PROFILE
DRAFT
MT-3 SCHEME

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2009 Red Line / Blue Line Connector Study

# 5.0 Red Line / Blue Line Connector Study Presentation of Modeling Method

Scott A Peterson, CTPS

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# What is CTPS and why are we involved?

- CTPS is the support staff to the Boston Metropolitan Area Planning Organization, created in 1974 to support the 3C planning process.
- The staff is multidisciplinary: it includes transportation analysts, planners, and engineers, as well as other support professionals.
- We maintain a regional travel demand model to assist the MPO with federal certification work such as the Regional Transportation Plan and Air Quality Conformity.
- The model set is a tool that allows us to examine transportation projects in a consistent and unbiased approach. Same model being used in the Green Line Extension, Silver Line Phase III, and Assembly Sq. work.

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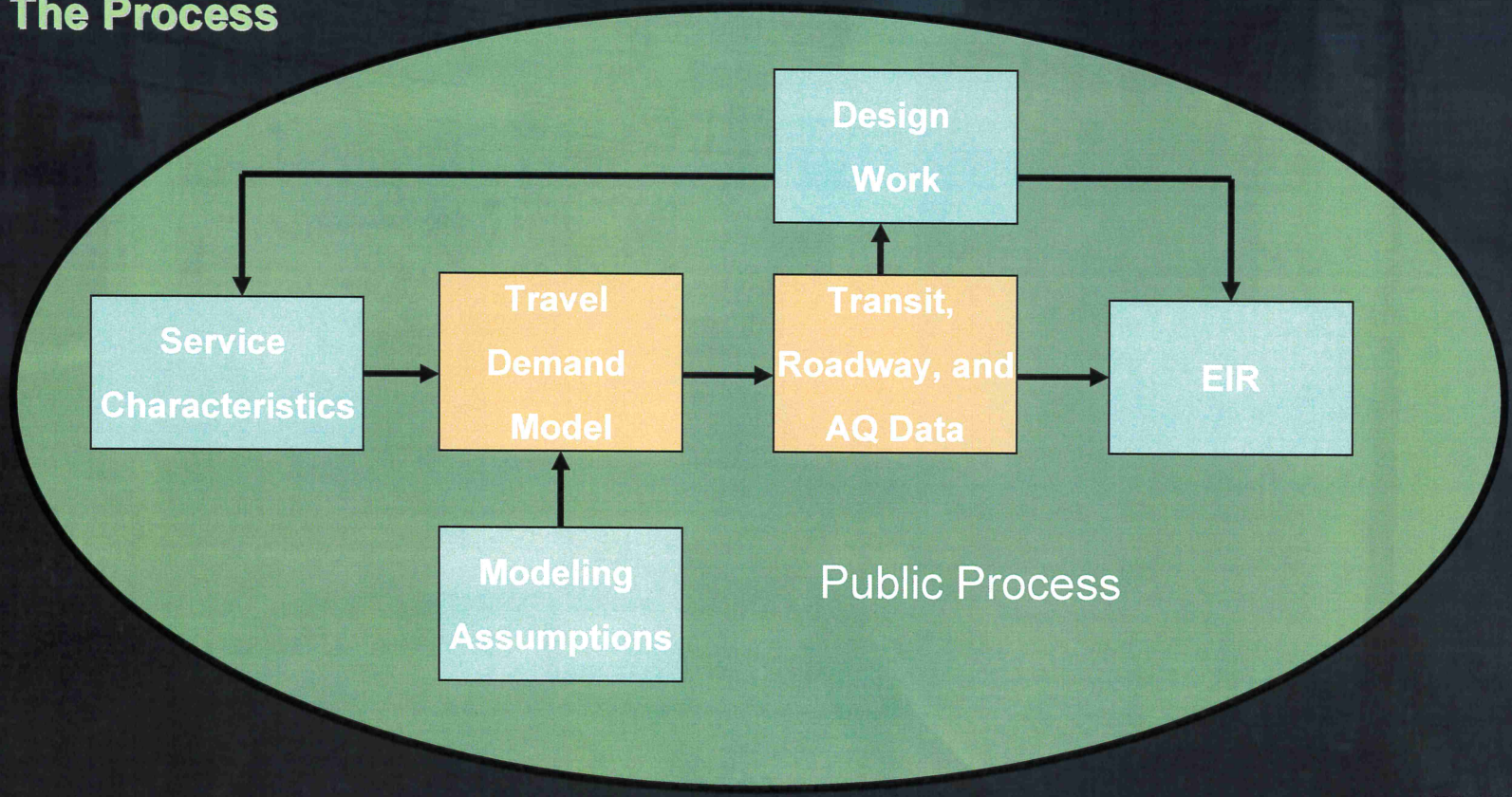
## 2009 Red Line / Blue Line Connector Study

# The Process

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# Modeling Terminology

- Geography
- TAZ's
- Demand Side
- Supply Side
- Time Periods

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## Transportation Analysis Zones

## Unit of Geographic Analysis

- 2727 internal TAZ's covering 164 communities
- 124 external stations feeding into the model

**Designed to:**

- Represent homogeneous land uses
- Adhere to transportation and political boundaries
- Try to adhere to census geography
- Produce and attract an equal number of trips

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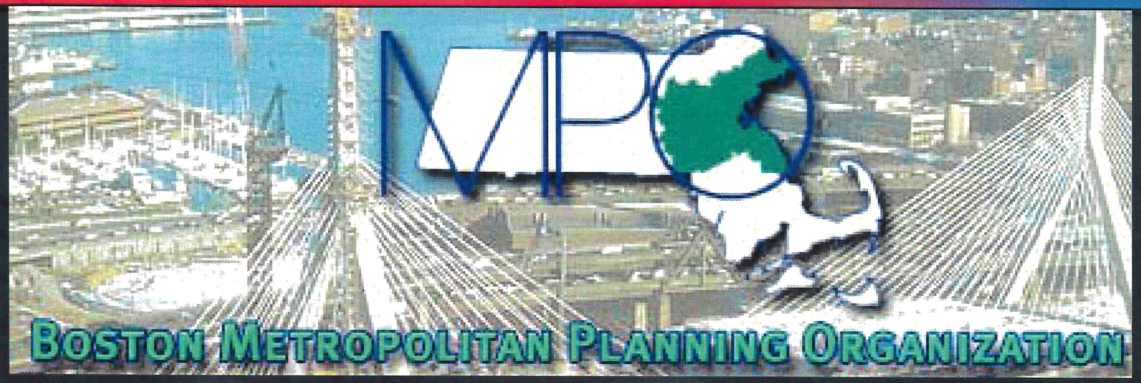


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# TAZ's in the Study Area

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## Supply Side

Roadway system contain highways, arterials, collectors, & some local roads

Attributes used by direction and time period

- free flow speed
- length of link
- tolls
- truck prohibitions
- capacity per lane per hour
- # lanes
- functional class
- turn penalties

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## Time Periods

Four Time Periods = Avg. Weekday Travel in the Spring

Time Periods Are:

- AM Peak 3 hours (6:00-9:00AM)
- Midday 6 hours (9:00-3:00PM)
- PM Peak 3 hours (3:00-6:00 PM)
- Night-time 12 hours (6:00PM-6:00AM)

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## How the model is Applied in an Alternatives Analysis

1. Base year network checked and updated if needed
2. 2006 base year is calibrated to existing conditions
3. Trip tables consistent with the RTP are used for future
4. Transportation networks for a forecast year no-build are defined and determined
5. No-build model is run
6. Build transportation networks are defined using:
   - Changes to the Highway Characteristics
   - Changes to the Transit Characteristics
7. Build model runs conducted and compared against the no-build

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